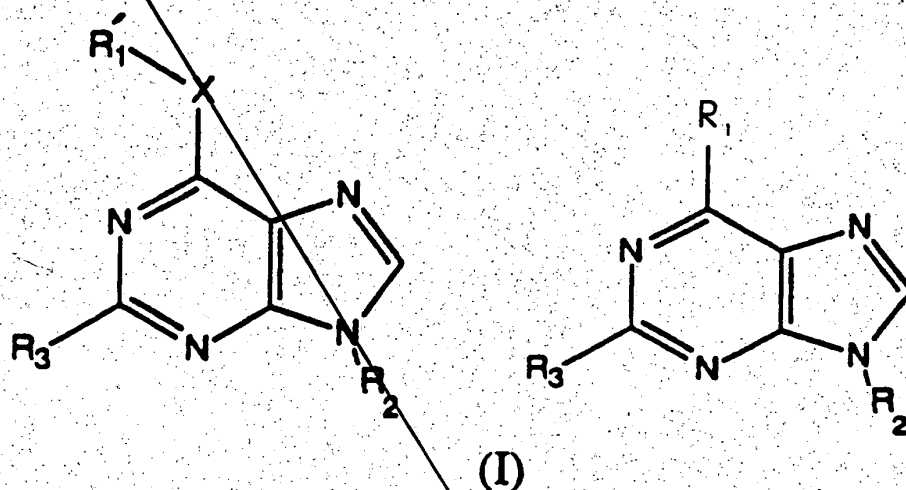


What we claim is:

A 2,6,9-trisubstituted purine composition of matter having the following formula:

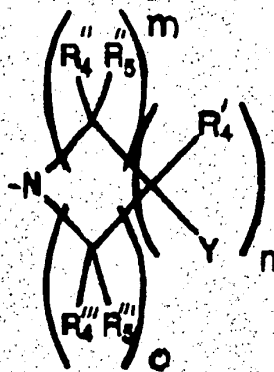


5 R_1 is halogen or R'_1-X wherein X is a amino, oxo, thio, or sulfone moiety.

R'_1 is a lower alkyl, substituted lower alkyl, cycloalkyl, substituted cycloalkyl, cycloheteroalkyl, substituted cycloheteroalkyl, aryl, substituted aryl, heterocycle, hetaryl, substituted hetaryl, aralkyl, heteroaralkyl, heteroalkyl, alkyl alkenyl, alkyl alkynyl, alkyl cycloalkyl, or alkyl cycloheteroalkyl, each having from 1 to 20 carbon atoms;

10 R_2 is hydrogen, or hydrocarbon compound selected from the group lower alkyl, substituted lower alkyl, cycloalkyl, substituted cycloalkyl, aryl, substituted aryl, heterocycle, hetaryl, substituted hetaryl, aralkyl, heteroaralkyl, heteroalkyl, alkyl alkenyl, alkyl alkynyl, alkyl cycloalkyl, or alkyl cycloheteroalkyl wherein each hydrocarbon compound has from 1 to 20 carbon atoms;

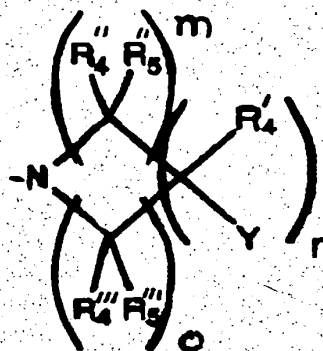
15 R_3 is halogen, hydroxyl, thio, alkoxy, alkylthio, lower alkyl, $-NR_4R_5$ or a component having the formula:



where $m=1-3$, $n=1-3$, $o=1-3$, Y =carbonyl, $-NR_4R_5$, hydroxyl, thiol, alkoxy, alkythio, and wherein R_4 and R_5 are each independently hydrogen, or a hydrocarbon selected from the group including lower alkyl, substituted lower alkyl, alkoxy, amino, amido, carboxyl, cycloalkyl, substituted cycloalkyl, heterocycle, cycloheteroalkyl, substituted cycloheteroalkyl, acyl, aryl, substituted aryl, aryloxy, hetaryl, substituted hetaryl, aralkyl, heteroaralkyl, alkyl alkenyl, alkyl alkynyl, alkyl cycloalkyl, alkyl cycloheteroalkyl, or cyano, wherein each hydrocarbon has from 1 to 20 carbon atoms wherein when Y is carbonyl, R_4' does not exist in the composition, R_4'' and R_5'' may be a single oxygen atom, R_4''' and R_5''' may be a single oxygen atom, and wherein when R_3 is 2-hydroxyethylamino and R_2 is methyl, $R_1'-X$ is not amino, 3-methyl-2-butenylamino, benzylamino, or m-hydroxybenzyl-amino, when R_3 is 2-hydroxyethylamino, when R_2 is isopropyl, $R_1'-X$ is not benzylamino, m-hydroxybenzylamino, or 3-methylbutylamino, when R_3 is 2-hydroxyethylamino and R_2 is 2-hydroxyethyl, $R_1'-X$ is not benzylamino and when R_3 is selected from the group consisting of 2-propanol-2-methylamino and 2-dimethylaminoethylamino and R_2 is methyl, then $R_1'-X$ is not benzylamino.

2. The 2,6,9-trisubstituted purine composition of claim 1 wherein X is amino.

3 The 2,6,9-trisubstituted purine composition of claim 1 wherein R_3 is a component having the formula:



10 B

where $m=1-3$, $n=1-3$, $o=1-3$, $Y=\text{carbonyl}$, $-\text{NR}_4\text{R}_5$, hydroxyl, thiol, alkoxy, alkythio, and wherein R_4 and R_5 are each selected from the group including hydrogen, lower alkyl, substituted lower alkyl, alkoxy, amino, amido, carboxyl, cycloalkyl, substituted cycloalkyl, heterocycle, cycloheteroalkyl, substituted cycloheteroalkyl, acyl, aryl, substituted aryl, aryloxy, hetaryl, substituted hetaryl, aralkyl, heteroaralkyl, alkyl alkenyl, alkyl alkynyl, alkyl cycloalkyl, alkyl cycloheteroalkyl, or cyano wherein when Y is carbonyl, R_4' does not exist in the composition, R_4'' and R_5'' may be a single oxygen atom, R_4''' and R_5''' may be a single oxygen atom.

4. The 2,6,9-trisubstituted purine composition of claim 3 wherein R_1' is selected from the group consisting of aralkyl and heteroarylalkyl.

5. The 2,6,9-trisubstituted purine composition of claim 4 wherein R_1' is selected from the group consisting of aralkyl, unsubstituted pyridylalkyl and substituted pyridylalkyl and wherein R_2 is selected from the group consisting of lower alkyl, substituted lower alkyl,

and alkyl cycloalkyl.

6. The 2,6,9-trisubstituted purine composition of claim 3 wherein R_1' is selected from the group consisting of aryl, heterocycle, heteroaryl, substituted heteroaryl, and substituted aryl.

5 7. The 2,6,9-trisubstituted purine composition of claim 3 wherein R_1' is selected from the group consisting of aryl, unsubstituted pyridyl, substituted pyridyl, and substituted aryl, and R_2 is selected from the group consisting of lower alkyl, substituted lower alkyl, and alkyl cycloalkyl.

8. The 2,6,9-trisubstituted purine composition of claim 2 wherein R_3 is $-NR_4R_5$,
10 wherein R_4 and R_5 are each selected from the group consisting of hydrogen, lower alkyl, substituted lower alkyl, alkoxy, amino, amide, carboxyl, cycloalkyl, substituted cycloalkyl, heterocycle, cycloheteroalkyl, substituted cycloheteroalkyl, acyl, aryl, substituted aryl, aryloxy, hetaryl, substituted hetaryl, aralkyl, heteroaralkyl, alkyl alkenyl, alkyl alkynyl, alkyl cycloalkyl, alkyl cycloheteroalkyl, or cyano.

15 9. The 2,6,9-trisubstituted purine composition of claim 8 wherein R_1' is selected from the group consisting of aralkyl, substituted pyridylalkyl, and unsubstituted pyridylalkyl, R_2 is selected from the group consisting of lower alkyl, substituted lower alkyl, cycloalkyl, and substituted cycloalkyl, R_4 is a substituted lower alkyl having from 2 to 6 carbon atoms, and R_5 is selected from the group consisting of hydrogen, lower alkyl, substituted lower
20 alkyl, aryl, substituted aryl, cycloalkyl, aryl cycloalkyl, heterocycle, substituted heterocycle, heteroaryl, substituted heteroaryl, heteroalkyl, heteroaralkyl, and substituted cycloalkyl.

10. The 2,6,9-trisubstituted purine composition of claim 8 wherein R_1' is selected from the group consisting of aryl, substituted aryl, pyridyl, and substituted pyridyl, R_2 is

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selected from the group consisting of lower alkyl, substituted lower alkyl, cycloalkyl, alkyl
cycloalkyl, and substituted cycloalkyl, R_4 is a substituted lower alkyl having from 2 to 6
carbon atoms, and R_5 is selected from the group consisting of hydrogen, lower alkyl,
substituted lower alkyl, aryl, substituted aryl, cycloalkyl, aryl cycloalkyl, heterocycle,
5 substituted heterocycle, heteroaryl, substituted heteroaryl, heteroalkyl, heteroaralkyl, and
substituted cycloalkyl.

11. The 2,6,9-trisubstituted purine composition of claim 8 wherein R_1' is selected
from the group consisting of aralkyl, pyridylalkyl, and substituted pyridylalkyl, R_2 is selected
from the group consisting of lower alkyl, substituted lower alkyl, and alkyl cycloalkyl, and R_4
10 and R_5 are each a substituted lower alkyl having from 2 to 6 carbon atoms.

12. The 2,6,9-trisubstituted purine composition of claim 8 wherein R_1' is CH_2 -
Aryl or CH_2 - substituted aryl, R_2 is lower alkyl or substituted lower alkyl, and R_4 and R_5 are
each $-\text{CH}_2\text{CH}_2\text{OH}$, $-\text{CHR}'\text{CH}_2\text{OH}$, or $-\text{CH}_2\text{CHR}'\text{OH}$ wherein R' is hydrogen or alkyl
having from 1 to 6 carbon atoms.

13. The 2,6,9-trisubstituted purine composition of claim 12 wherein R_2 is
isopropyl.

14. The 2,6,9-trisubstituted purine composition of claim 8 wherein R_1' is selected
from the group consisting of aryl, substituted aryl, pyridyl, and substituted pyridyl, R_2 is
selected from the group consisting of lower alkyl, substituted lower alkyl, and alkyl
20 cycloalkyl, and R_4 and R_5 are each a substituted lower alkyl having from 2 to 6 carbon atoms.

15. The 2,6,9-trisubstituted purine composition of claim 8 wherein R_1' is aryl or
substituted aryl, R_2 is lower alkyl, or substituted lower alkyl, and R_4 and R_5 are each
 $\text{CH}_2\text{CH}_2\text{OH}$, $-\text{HR}'\text{CH}_2\text{OH}$, or $-\text{CH}_2\text{CHR}'\text{OH}$ wherein R' is hydrogen or alkyl having from 1

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to 6 carbon atoms.

16. The 2,6,9-trisubstituted purine composition of claim 15 wherein R₂ is isopropyl.
17. The 2,6,9-trisubstituted purine composition of claim 8 wherein R₁' is benzyl substituted with a halogen, alkoxy, phenyl, pyridyl or nitro group, R₂ is isopropyl, and R₄ and R₅ are each -CH₂CH₂OH.
18. The 2,6,9-trisubstituted purine composition of claim 8 wherein R₁' is phenyl substituted with a halogen, alkoxy, phenyl, pyridyl or nitro group, R₂ is isopropyl, and R₄ and R₅ are each -CH₂CH₂OH.
19. The 2,6,9-trisubstituted purine composition of claim 8 wherein R₁' is biphenyl, R₂ is isopropyl, and R₄ and R₅ are each -CH₂CH₂OH.
20. The 2,6,9-trisubstituted purine composition of claim 8 wherein R₁' is selected from the group consisting of 3-thiomethoxyphenyl, 4-thiomethoxyphenyl, 4-bromophenyl, 4-phenylbenzyl, 4-methoxybenzyl, 4-biphenyl, 3-methoxybenzyl, 4-(2-thienyl)benzyl, 4-(4-methyl)phenylbenzyl, 4-(4-trifluoromethyl)phenylbenzyl, 4-(4-nitrilo)phenylbenzyl, 4-(2-pyridinyl)benzyl, piperonyl, 3-methoxybenzyl, 4-chlorobenzyl, and 4-nitrobenzyl, R₂ is isopropyl, and R₄ and R₅ are both CH₂CH₂OH.
21. The 2,6,9-trisubstituted purine composition of claim 20 wherein R₁' is 4-methoxybenzyl.
22. The 2,6,9-trisubstituted purine composition of claim 20 wherein R₁' is 4-phenylbenzyl.
23. The 2,6,9-trisubstituted purine composition of claim 20 wherein R₁ is 4-methoxybenzyl.

24. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-biphenyl.

25. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 3-methoxybenzyl.

5 26. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-(2-thienyl)benzyl.

27. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-(4-methyl)phenylbenzyl.

10 28. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-(4-trifluoromethyl)phenylbenzyl.

29. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-(4-nitrilo)phenylbenzyl. *B*

30. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-(2-pyridinyl)benzyl.

15 31. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is piperonyl.

32. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 3-thiomethoxyphenyl.

20 33. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-thiomethoxyphenyl.

34. The 2,6,9-trisubstituted purine composition of claim 20 wherein R'₁ is 4-bromophenyl.

35. A cationic salt of the composition of claim 1

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36. An acid addition salt of the composition of claim 1.
37. A method for inhibiting cell proliferation in mammals comprising administering a therapeutically effective amount of the composition of claim 1 to the mammal.
- 5 38. The method of claim 37 wherein the therapeutically effective amount ranges from about 0.001 to about 100 mg/kg weight of the mammal.
39. The method of claim 37 wherein the composition is administered to a mammal suffering from a cell proliferation disorder selected from the group consisting of rheumatoid arthritis, lupus, type I diabetes, multiple sclerosis, cancer, restenosis, host graft disease, and
- 10 gout. *B*
40. The method of claim 39 wherein the cell proliferation disorder is restenosis.
41. The method of claim 39 wherein the cell proliferation is disorder cancer.
42. The method of claim 39 wherein the cell proliferation disorder is polycystic kidney disease.
- 15 43. The method of claim 39 wherein the mammal is a human.
44. A pharmaceutical composition of matter comprising the composition of claim 1 and one or more pharmaceutical excipients.
45. The pharmaceutical composition of matter of claim 43 wherein the pharmaceutical composition is in the form of a solution.
- 20 46. The pharmaceutical composition of matter of claim 43 wherein the pharmaceutical composition is in the form of a tablet.
47. An antifungal agent useful for treating fungal infections in humans, and animals comprising the composition of claim 1.